

contiguous nucleotides of a nucleic acid sequence selected from the group consisting of SEQ ID NO:26 and SEQ ID NO:29,

(2) a nucleic acid linker of  $(XXX)_n$  wherein  $n=0$  to 60, and

(3) an isolated nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO:32, SEQ ID NO:35, and a nucleic acid molecule comprising at least 44 contiguous nucleotides identical in sequence to at least 44 contiguous nucleotides of a nucleic acid sequence selected from the group consisting of SEQ ID NO:32 and SEQ ID NO:35, such that said nucleic acid molecule of (i) encodes a feline IL-12 single chain protein; and

(ii) a nucleic acid molecule comprising a nucleic acid sequence fully complementary to the coding strand of any of said nucleic acid molecules as set forth in (i);

(b) an isolated nucleic acid molecule selected from the group consisting of:

(i) a nucleic acid molecule comprising

(1) an isolated nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO:52 and SEQ ID NO:58, and a nucleic acid sequence comprising at least 47 contiguous nucleotides identical in sequence to at least 47 contiguous nucleotides of a nucleic acid sequence selected from the group consisting of SEQ ID NO:46 and SEQ ID NO:49,

(2) a nucleic acid linker of  $(XXX)_n$  wherein  $n=0$  to 60, and

(3) an isolated nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO:46, SEQ ID NO:49, and a nucleic acid molecule comprising at least 47 contiguous nucleotides identical in sequence to at least 47 contiguous nucleotides of a nucleic acid sequence selected from the group consisting of SEQ ID NO:46 and SEQ ID NO:49, such that said nucleic acid molecule of (i) encodes a canine IL-12 single chain protein; and

(ii) a nucleic acid molecule comprising a nucleic acid sequence fully complementary to the coding strand of any of said nucleic acid molecules as set forth in (i);

(c) an isolated nucleic acid molecule selected from the group consisting of:

(i) a nucleic acid molecule comprising

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(1) a nucleic acid molecule comprising a nucleic acid sequence that is at least 87 percent identical to a nucleic acid sequence selected from the group consisting of SEQ ID NO:26 and SEQ ID NO:29, or a fragment thereof of at least 55 nucleotides in length,

(2) a nucleic acid linker of  $(XXX)_n$  wherein  $n=0$  to 60, and

(3) a nucleic acid molecule comprising a nucleic acid sequence that is at least 87 percent identical to a nucleic acid sequence selected from the group consisting of SEQ ID NO:32 and SEQ ID NO:35, or a fragment thereof of at least 55 nucleotides in length, such that said nucleic acid molecule (i) encodes a feline IL-12 single chain protein; and

(ii) a nucleic acid molecule comprising a nucleic acid sequence fully complementary to the coding strand of a nucleic acid molecule as set forth in (i);

(d) an isolated nucleic acid molecule selected from the group consisting of:

(i) a nucleic acid molecule comprising

(1) an isolated nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO:52, SEQ ID NO:58, and a nucleic acid sequence comprising at least 55 contiguous nucleotides identical in sequence to at least 55 contiguous nucleotides of a nucleic acid sequence selected from the group consisting of SEQ ID NO:52 and SEQ ID NO:58,

(2) a nucleic acid linker of  $(XXX)_n$  wherein  $n=0$  to 60, and

(3) an isolated nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO:46, SEQ ID NO:49, and a nucleic acid molecule comprising at least 55 contiguous nucleotides identical in sequence to at least 55 contiguous nucleotides of a nucleic acid sequence selected from the group consisting of SEQ ID NO:46 and SEQ ID NO:49, such that said nucleic acid molecule of (i) encodes a canine IL-12 single chain protein; and

(ii) a nucleic acid molecule comprising a nucleic acid sequence fully complementary to the coding strand of any of said nucleic acid molecules as set forth in (i);

(e) a nucleic acid molecule having a nucleic acid sequence encoding an IL-12 single chain protein comprising an IL-12 p40 subunit domain linked to a IL-12 p35 subunit domain, wherein said p40 subunit domain is selected from the group consisting of

(i) a p40 subunit protein having an amino acid sequence that is at least 84 percent identical to an amino acid sequence selected from the group consisting of SEQ ID NO:27 and SEQ ID NO:30;

(ii) a p40 subunit protein comprising a fragment of a protein of (i) wherein said fragment is at least 30 amino acids in length; and

(iii) a p40 subunit protein comprising at least 23 contiguous amino acids identical in sequence to at least 23 contiguous amino acids of an amino acid sequence selected from the group consisting of SEQ ID NO:27 and SEQ ID NO:30;

wherein said p35 subunit domain is selected from the group consisting of

(i) a p35 subunit protein having an amino acid sequence that is at least 84 percent identical to an amino acid sequence selected from the group consisting of SEQ ID NO:33 and SEQ ID NO:36;

(ii) a p35 subunit protein comprising a fragment of a protein of (i), wherein said fragment is at least 30 amino acids in length; and

(iii) a p35 subunit protein comprising at least 23 contiguous amino acids identical in sequence to at least 23 contiguous amino acids of an amino acid sequence selected from the group consisting of SEQ ID NO:33 and SEQ ID NO:36;

(f) a nucleic acid molecule having a nucleic acid sequence encoding an IL-12 single chain protein comprising an IL-12 p40 subunit domain linked to a IL-12 p35 subunit domain, wherein said p40 subunit domain is selected from the group consisting of

(i) a p40 subunit protein having an amino acid sequence that is at least 84 percent identical to an amino acid sequence selected from the group consisting of SEQ ID NO:53 and SEQ ID NO:59;

(ii) a p40 subunit protein comprising a fragment of a protein of (i), wherein said fragment is at least 40 amino acids in length; and

(iii) a p40 subunit protein comprising at least 31 contiguous amino acids identical in sequence to at least 31 contiguous amino acids of an amino acid sequence selected from the group consisting of SEQ ID NO:53 and SEQ ID NO:59;

wherein said p35 subunit domain is selected from the group consisting of

(i) a p35 subunit protein having an amino acid sequence that is at least 84 percent identical to an amino acid sequence selected from the group consisting of SEQ ID NO:47 and SEQ ID NO:50;

(ii) a p35 subunit protein comprising a fragment of a protein of (i), wherein said fragment is at least 40 amino acids in length; and

(iii) a p35 subunit protein comprising at least 31 contiguous amino acids identical in sequence to at least 31 contiguous amino acids of an amino acid sequence selected from the group consisting of SEQ ID NO:47 and SEQ ID NO:50; and

(g) a nucleic acid molecule comprising a nucleic acid sequence fully complementary to the coding strand of any of said nucleic acid molecules as set forth in (e) or (f).

2. (Once amended) The nucleic acid molecule of Claim 1, wherein said nucleic acid molecule as set forth in (a), (b), (c), (d), (e) or (f) comprises a nucleic acid sequence that encodes a feline IL-12 single chain protein.

3. (Once amended) The nucleic acid molecule of Claim 1, wherein said nucleic acid molecule selected from the group consisting of (a), (b), (c), (d), (e) and (f) encodes a protein having a function selected from the group consisting of

(i) eliciting an immune response against an IL-12 protein having an amino acid sequence selected from the group consisting of SEQ ID NO:39, SEQ ID NO:44, SEQ ID NO:62, and SEQ ID NO:67;

(ii) selectively binding to an antibody raised against an IL-12 protein having an amino acid sequence selected from the group consisting of SEQ ID NO:27, SEQ ID NO:30, SEQ ID NO:33, SEQ ID NO:36, SEQ ID NO:47, SEQ ID NO:50, SEQ ID NO:53, and SEQ ID NO:59, SEQ ID NO:102, SEQ ID NO:105, SEQ ID NO:108, SEQ ID NO:39, SEQ ID NO:40, SEQ ID NO:62, and SEQ ID NO:67; and

(iii) exhibiting IL-12 activity.

4. (Once amended) The nucleic acid molecule of Claim 1, wherein said nucleic acid molecule comprises a nucleic acid molecule selected from the group consisting of nFeIL-12<sub>1599</sub>, nFeIL-12<sub>1533</sub>, nCaIL-12<sub>1599</sub>, and nCaIL-12<sub>1533</sub>.

5. (Once amended) The nucleic acid molecule of Claim 1, wherein said nucleic acid molecule is selected from the group consisting of:

(a) a nucleic acid molecule comprising a nucleic acid sequence that encodes a protein having an amino acid sequence selected from the group consisting of SEQ ID NO:39, SEQ ID NO:44, SEQ ID NO:62, and SEQ ID NO:67; and

(b) a nucleic acid molecule comprising an allelic variant of a nucleic acid molecule encoding a protein having any of said amino acid sequences of (a).

6. (Once amended) The nucleic acid molecule of Claim 1, wherein said nucleic acid molecule is selected from the group consisting of:

(a) a nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO:38, SEQ ID NO:40, SEQ ID NO:43, SEQ ID NO:45, SEQ ID NO:61, SEQ ID NO:63, SEQ ID NO:66, and SEQ ID NO:68; and

(b) a nucleic acid molecule comprising an allelic variant of a nucleic acid molecule comprising any of said nucleic acid sequences of (a).

7. (Once amended) A nucleic acid molecule selected from the group consisting of: the nucleic acid molecule of Claim 1(a)(i) comprising, in the following order, (1), (2), and (3), the nucleic acid molecule of Claim 1(b)(i) comprising, in the following order, (1), (2), and (3), the nucleic acid molecule of Claim 1(c)(i) comprising, in the following order, (1), (2), and (3), and the nucleic acid molecule of Claim 1(d)(i) comprising, in the following order, (1), (2), and (3).

8. (Reiterated) The nucleic acid molecule of Claim 7, wherein said nucleic acid sequence encoding said linker comprises SEQ ID NO:83.

9. (Reiterated) The nucleic acid molecule of Claim 7, wherein said single chain protein comprises a p40 subunit at the N-terminus and a p35 subunit at the C-terminus.

10. (Reiterated) A recombinant molecule comprising a nucleic acid molecule as set forth in Claim 1.

11. (Reiterated) A recombinant virus comprising a nucleic acid molecule as set forth in Claim 1.

12. (Reiterated) A recombinant cell comprising a nucleic acid molecule as set forth in Claim 1.